Gr. 28569 (2)

PATENT SPECIFICATION

DRAWINGS ATTACHED

832,784

Date of Application and filing Complete Specification: Aug. 8, 1956.

No. 24263/56.

Application made in Germany on March 19, 1956.

Complete Specification Published: April 13, 1960.

Ind x at acceptance:—Classes **12(1)**, A5C(2 : 3) ; **and 80(2)**, U5A1.

International Classification:—**F06c, d.**

COMPLETE SPECIFICATION

Improvements in and relating to Universal Joints

We, GELENKWELLENBAU G.M.B.H., of 7, Westendhof, Essen, Germany, a German company, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement: —

This invention relates to a universal joint which is suitable for use with universal joint shafts of the most varied kind. Hitherto, in universal joints axial centering at the individual journals has been taken up by means of the front surfaces of the journal cross. This has the disadvantage, that the bearing places have to be very carefully tooled, in order to obtain perfectly satisfactory centering of the journal cross.

The present invention consists in a universal joint for joint shafts or the like with journals at the ends of the journal cross and with a bushing surrounding each journal and between which needle rollers of a needle bearing are provided, characterised in that the outer wall of the journal and the inner wall of the bushing are conical over their entire length or over part of their length and that the needle rollers mounted therebetween are either cylindrical rollers or cylindrical and conical rollers in such a manner that the associated bearing, journal and bushing are centred and take up axial forces. Such arrangement no longer requires the careful tooling of the end surfaces of the journal cross, as at this place the forces are no longer transmitted or the centering no longer takes place. Primarily, with such arrangement it is possible to realise an adjustment of the seating with freedom of play, as a taking up of the bearings is also possible. An adjustment with freedom of play is particularly essential for drives, in which absolute freedom of play is necessary, as is the case, for instance, in drives for switch gear and switch drums in electric locomotives and street cars. This novel centering with freedom of play is also of advantage in connection with live force accuracy.

[*Price 3s.*

With the use of short, cylindrical needle rollers, a conical journal has the same angle as the conical bore of the bushing, and these short needles may be arranged offset next to one another in a cage. The seating can be subdivided into a cylindrical part with cylindrical needle rollers and into a conical part with conical needles. Long and short needles may be arranged alternately next to one another in a cage.

The needle rollers can run directly on the journals and in the bushings, the needle rollers being inserted in the usual manner without cage or also with cage. Hardened liners may, however, also be used, which are placed on the journal and/or inserted in the bushing, so that the remainder of the journal cross and the bushings may be made of unhardened material.

The journals and the bushings may be provided with grooves offset with respect to one another, whereby inaccuracies of the borings and the journals will be compensated. By this means the requisite accurate running surfaces in the rolling region of the needle rollers will form more rapidly.

Various constructional examples of universal joints according to the invention are illustrated in the accompanying drawing, in which:

Fig. 1 shows a universal joint diagrammatically, and

Figs. 2 to 4 various seatings in longitudinal section.

The universal joint consists in the usual manner of a journal cross 1 with the four journals 2 which are embraced by bushings 3, 4 and 5, 6 respectively. The bushings 3 and 4 are connected in the usual manner with the shaft 7, whilst the bushings 5 and 6 at right angles thereto are connected to the universal joint shaft part 8.

It has hitherto been the practice to take up the axial forces and to effect the centering of the journal cross by the end surface of the individual journals. According to the invention needle bearings are used whose needle rollers

Pr.

are either cylindrical and run between conical bearing surfaces or whose needle rollers are partly of cylindrical form and partly of conical form and run between cylindrical or conical bearing surfaces so that the bearing journals and bearing bushings are centred and can take up axial forces.

Fig. 2 shows a constructional form with a conical journal 16 and a bushing 17 which also has a conical bore. The angles of the two cones are the same, so that in this case cylindrical needle rollers 18 can be used, which are made correspondingly short. With advantage these needle rollers may be housed in a conical cage.

Fig. 3 shows a further constructional example of a bearing. In this case the outer end 24 of the journal is made cylindrical. Cylindrical needle rollers 25 are introduced into the bushing, the portion 26 of which is bored out also cylindrically. This cylindrical portion 24 of the journal is followed by a conical portion 27, on which conical needle rollers 28 run, the needle rollers 28 being offset from the needle rollers 25 in a space between the journal and the bearing. The portion 29 of the bushing is also made correspondingly conical. In this Figure is indicated, that a packing ring 30 may be used with the aid of an angle piece 31 for packing the bearing.

Fig. 4 shows the opposite arrangement of the conical and the cylindrical portion. In this case the conical portion 27 of the journal lies at the outer end. In this case as well a long conical needle roller 28 is used. The conical part is continued by the cylindrical part 24 with the short cylindrical needle rollers 25.

Whilst in the constructional examples hitherto described the needle rollers run directly on the journal and in the bore of the bushing, the needle rollers may be introduced between two liners. One liner may be fixed for instance by means of toothing on the journal, whilst the other liner may be set in the bushing.

Further, the journals and/or bushings may be provided with grooves offset with respect to one another. The grooves can also serve the purpose of conveying lubricant, if they are in communication with a suitable lubricant bore.

Any cone angle of the journal may be selected, but should not, of course, be so small that self-locking occurs. This also applies to the conical bore of the bushings 17 and 29.

WHAT WE CLAIM IS:—

1. A universal joint for joint shafts or the like with journals at the ends of the journal cross and with a bushing surrounding each journal and between which the needle rollers of a needle bearings are provided, characterised in that the outer wall of the journal and the inner wall of the bushing are conical over their entire length or over part of their length and that the needle rollers mounted therebetween are either cylindrical rollers or cylindrical and conical rollers in such a manner that the associated bearing, journal and bushing are centred and take up axial forces.

2. A universal joint according to claim 1, characterised in that the outer wall of the journal and the inner wall of the bushing are formed in a tapered manner with the same angle of inclination and direction over their entire length.

3. A universal joint according to claim 1, characterised in that the cylindrical needles comprise several rows of short needle rollers disposed over the whole length of the journal or the bushing.

4. A universal joint according to claim 1, characterised in that the outer wall of the journal and the inner wall of the bushing comprise a cylindrical part with cylindrical needle rollers, and a tapered part with tapered needle rollers.

5. A universal joint according to claim 1, characterised in that short cylindrical needles are arranged adjacent one another in an offset relationship in an intermediate space between the journal and the bushing.

6. A universal joint according to claim 1, characterised in that the journal and/or the bushing are formed by corresponding liners.

7. A universal joint according to claim 1, characterised in that the journals and/or the bushings are provided with grooves arranged offset with respect to one another.

8. A universal joint according to claim 7, characterised in that the grooves are connected with a lubricating bore.

9. The improved universal joint, substantially as hereinbefore described and illustrated in and by any of the figures of the accompanying drawing.

MARKS & CLERK.

Leamington Spa: Printed for Her Majesty's Stationery Office, by the Courier Press.—1960.
Published by The Patent Office, 25, Southampton Buildings, London, W.C.2, from which copies may be obtained.

Fig. 1

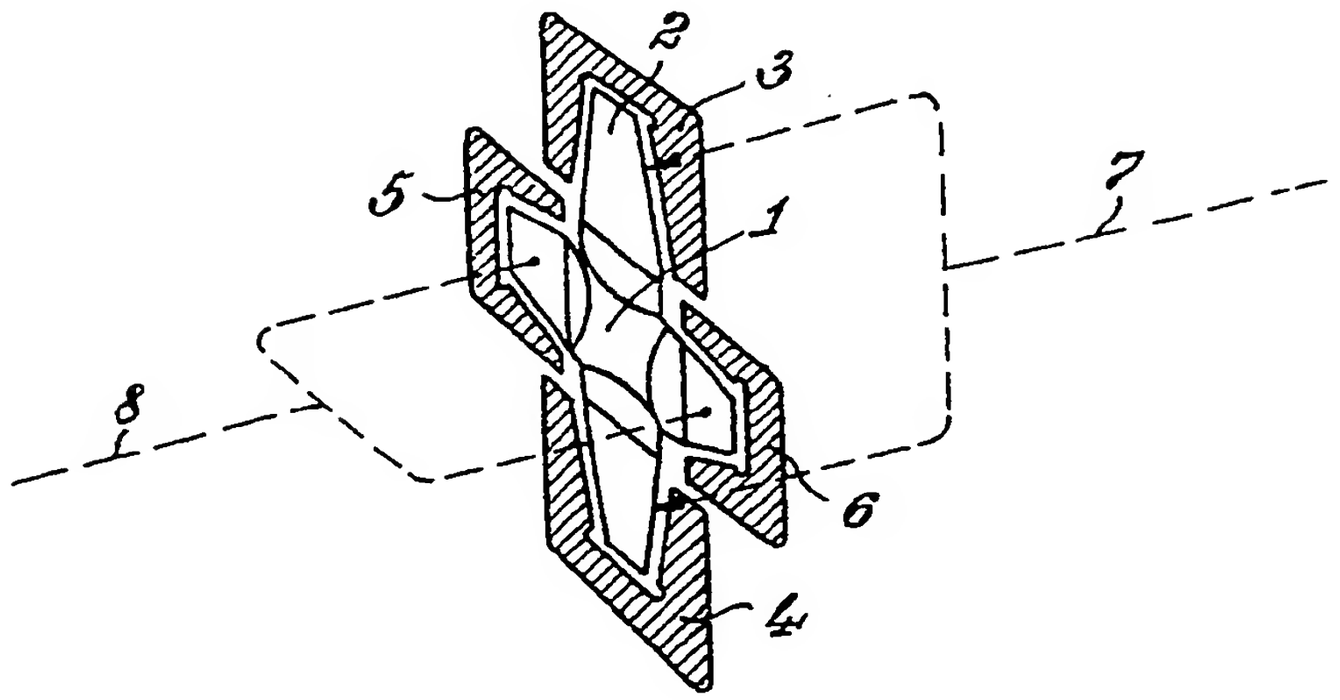


Fig. 2

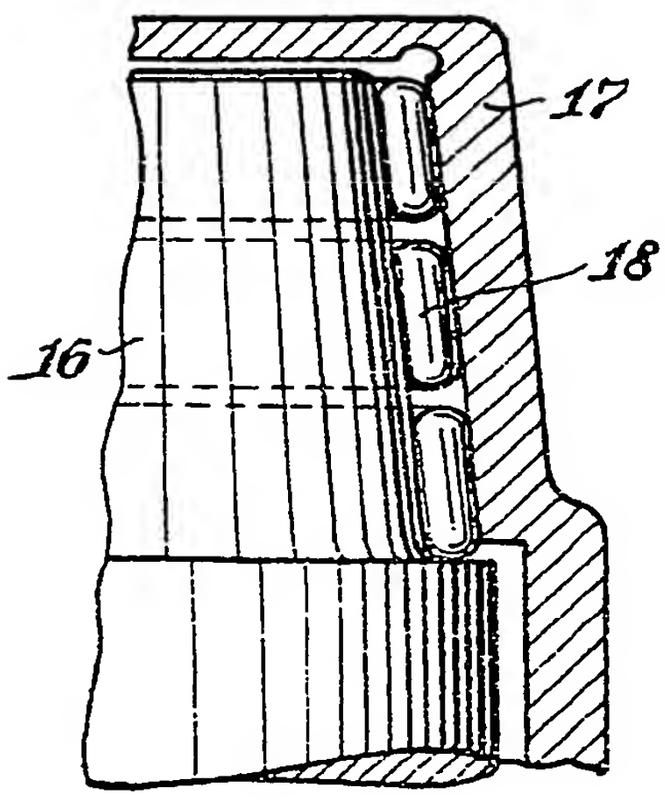
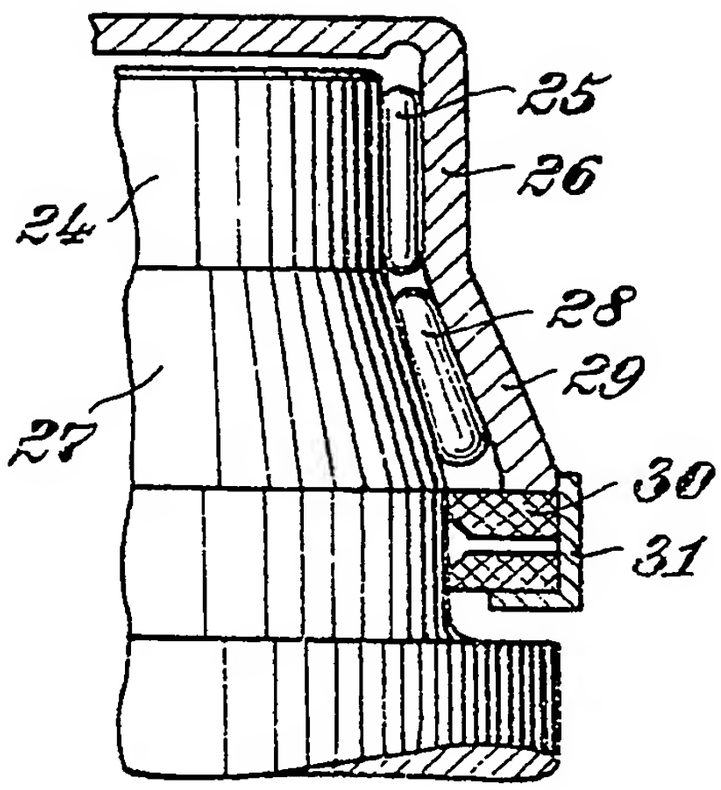


Fig. 3



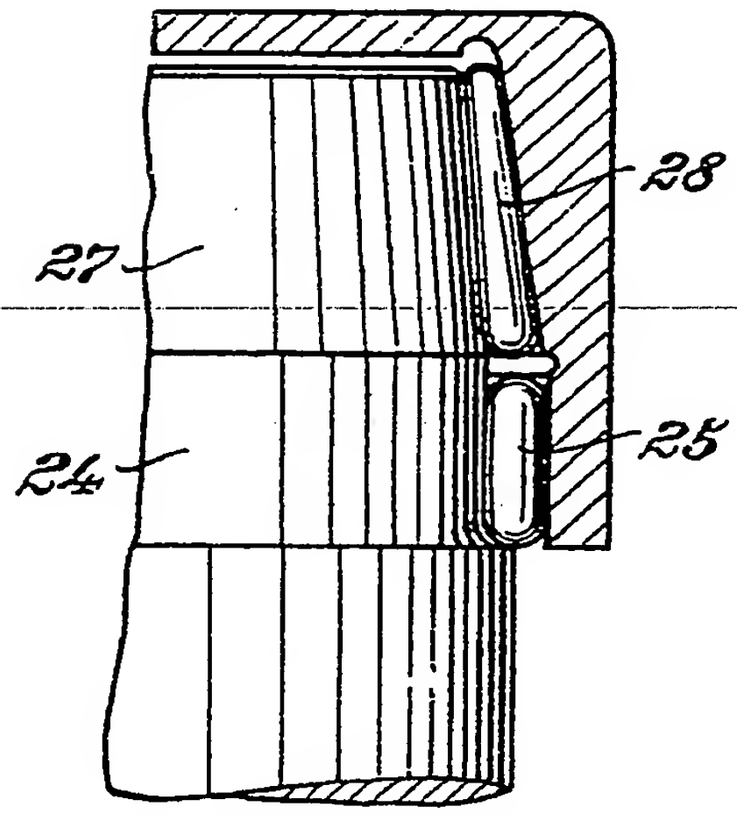
832,784 COMPLETE SPECIFICATION

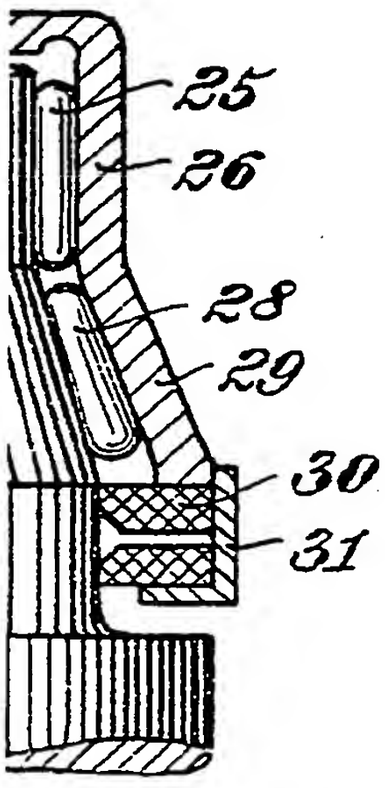
3 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEETS 1, 2 & 3

Fig. 4





832,784 COMPLETE SPECIFICATION
3 SHEETS

Fig. 1

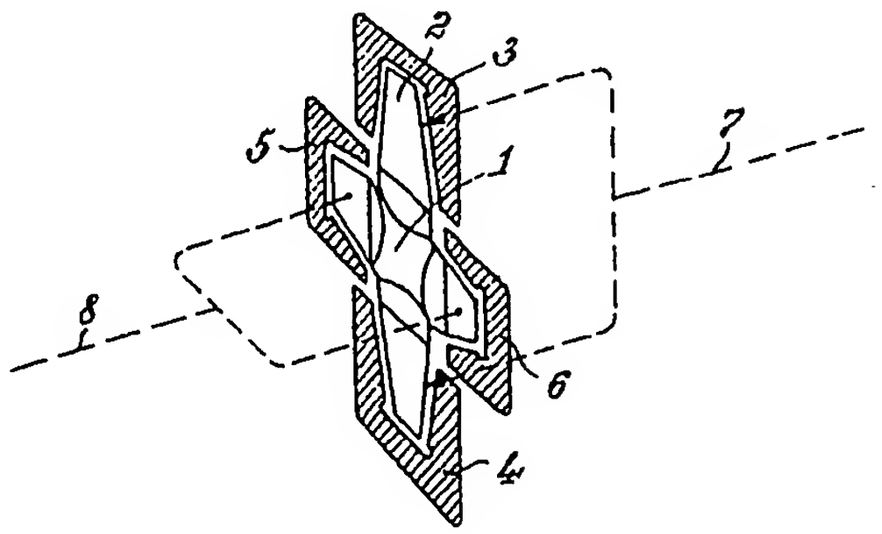


Fig. 2

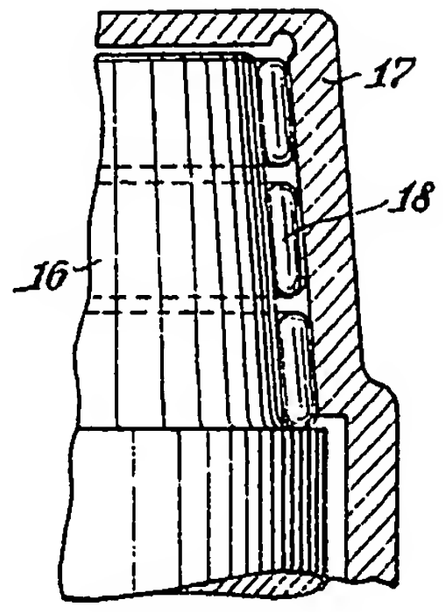


Fig. 3

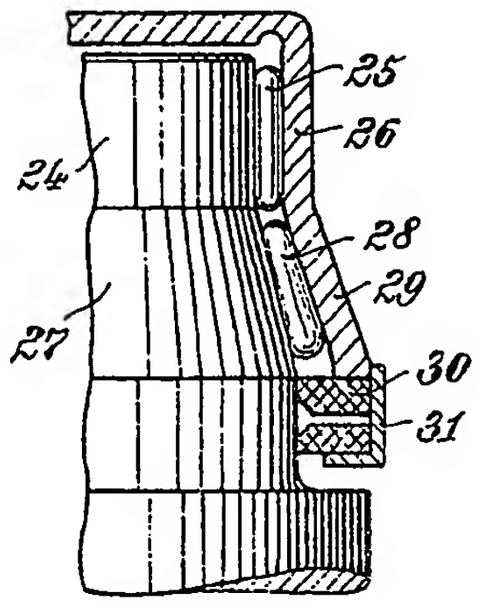


Fig. 4